years been greeted with apple blossoms missed even an opening bud on the ninety-first. My early harvest[1] in its sunny nook showed but the slightest tint of red on the 25th; lilacs failed to come out for Memorial Day. It may be said that the general backwardness mitigated the damage. The cold Memorial Day of 1884 was followed by the frost which wrought such havoc in market gardens, especially in the vicinity of New York. An eclipse of the sun on the 18th, with unfavorable planetary conjunctions, was held responsible for the perversity of 1882, and its general character—cold, cloudy, windy, moisty—justified the epithet, eclipsy, in that it eclipsed all previous specimens.

Next to it on my own record comes this May of 1907 with mean temperature of 50.39°, maximum of 85°, on the 14th, and minimum of 30° on the 12th. Lilacs on Memorial Day of 1907 were fairly usable; in 1888 they were overblown. In cloudiness 1907 has nearly paralled 1882. The mean of May for fifty years on Thompson Hill was 55.83°; warmest in 1880, 62.33°; range, 13.06°; maximum point 90° in 1880; minimum 27° in 1882 and 1861. Other cold Mays were: 1861, mean 52.21°; 1888, 52.28°. The Mays of 1900, 1901, 1902 were about 3° below the average.

And yet, after all our grumbling, May is May—in spite of Hosea Biglow, who says it is more like "Maynt". Frost can not conquer it, nor custom stale its infinite variety. The trees are now nearly in full leaf. The green of the grass was never so vivid, violets never so blue, dandelions never so plentiful nor golden.

MEMORANDUM ON THE GULF STREAM AND THE WEATHER.

The rather unusual weather of the spring and early summer of 1907 has lead many to ask for the cause, and whether, perhaps, climatic conditions have undergone a permanent change. The statement of a ship captain, or, more properly, that of a newspaper correspondent, to the effect that the location of the Gulf Stream has been altered by earthquakes has led many to imagine that such a change would affect the climate, and that possibly the times of planting, harvesting, etc., will have to be revised.

All of these suggestions and queries show such an entire ignorance of the laws that govern the atmosphere and the weather that it may be worth while to state authoritatively that earthquakes have no appreciable influence on the atmosphere, neither its temperature nor its wind nor its rain.

If any earthquake has had an influence on ocean currents, such as the Gulf Stream, it can only have been by reason of a change in the configuration of the bottom of the ocean; and such changes have always been so small that it is not believed that anyone or a combination of several such could have any appreciable influence on the Gulf Stream.

The Gulf Stream does not itself have any direct specific influence on the climate of North America. In that part of its course off the coast of the South Atlantic States easterly winds bring warm, moist air to the shore; but they would do so if there were no Gulf Stream since the surface of this part of the ocean is warm water, and the easterly winds would always bring its warmth and moisture to the land. In the northern part of its course, opposite the Middle Atlantic States, there is comparatively little east wind, and of course the west wind blows in the wrong direction.

The weather conditions of the South vary from year to year, but the climate, considered as the average of a century, does not change. We have records of unusual variations ever since the arrival of Columbus, and we must expect the same for ages to come. There may possibly be cycles in climate, but we have not yet been able to discover them or define them; and if they exist they certainly represent such small periodic changes as would be utterly insignificant to the planter.

The irregular variations in the weather from day to day and from season to season are due to irregular changes in the general circulation of the atmosphere, by reason of which the air that moves toward the equator and returns toward the poles makes a different circuit every time. The great irregularities of the weather that affect mankind are not due to sun spots, nor to the moon or stars, nor to earthquakes, nor to any other influence outside of the atmosphere, but result from its own internal mechanism. The great masses of air are surging to and fro over the earth's surface like the water boiling in a great caldron; any little float carried along in this water will circulate from the center to the edge and from top to bottom over and over, and yet never go thru the same path twice. In a similar way we never have the same identical sets of winds, temperatures, and rains year after year, but only general seasonal resemblances; and it would take several centuries to show the extreme limits of variability at any given locality. Between the Rockies and the Atlantic we are peculiarly subject to irregularities in cold northerly winds, which on the one hand may bring freezing weather to the Gulf coast, but on the other hand by pushing aside the warm moist air near the ground give rise to large areas of cloud and rain or snow, so that the irregularities in our weather are traceable back to irregularities in the interchange of air between the Tropics and the polar regions.

It has been suggested that a thoro investigation be made into the reliability of the report as to changes in the Gulf Stream—but this report is known to be utterly unreliable. The position of the Gulf Stream can not be ascertained by one observation by any ordinary navigator. Such work would require that a vessel be specially fitted out for the purpose and sail to and fro across the stream at many points, making careful observations of temperature of the water and other data. This was done years ago most thoroly by the cooperation of the Navy, the Coast Survey, and the Bureau of Fisheries, and if it were really worth while, the work could be repeated occasionally. But the exact course of the Gulf Stream has but little interest to meteorologists, however important it may be in questions bearing on the fisheries or on the drift of derelicts and other nautical matters. In fact, the surveys already made show that the surface waters of the Gulf Stream are liable to be pushed aside to a distance of a hundred miles by variations in the winds, those same winds that also affect the climate. It is not the Gulf Stream that affects the winds and the climate, but the winds that affect both the climate and the Gulf Stream. The winds are the prime factors in maintaining and altering the surface currents of the ocean.

The mild climate of western Europe and the still milder climate of the coast of Alaska, British Columbia, and Oregon, are not due to either the Gulf Stream of the Atlantic or the Japan Stream of the Pacific, but to the steady flow of winds laden with moisture from the ocean in general. The severe climates of China, Japan, New England, and Labrador are not due to the distances of the Gulf Stream or the Japan Stream from the respective coasts, but directly to the dry, cold northerly winds themselves.—*C. A.*

CLIMATE AND AGRICULTURE.

The following is an outline of a course of lectures by Prof. T. L. Lyon, of the New York State College of Agriculture, at Cornell University, delivered during the summer of 1906 before the students of the graduate school of agriculture at the University of Illinois, conducted under the auspices of the Association of Agricultural Colleges and Experiment Stations. The author states that in continuation of his studies in wheat and maize, he is intending to publish a paper on the relation

[1] That is, early harvest apple tree.—EDITOR.

of the climate and soil to the crop of barley, particularly as to its brewing qualities.

RELATION OF CEREAL CROPS TO CLIMATE AND SOIL.

By Prof. T. L. LYON.

(1) Modifications in cereal crops induced by changes in their environment.

Experiment and observations show that modifications occur in plants when carried from one environment to another.

These modifications affect the habits of growth and the yield and quality of grain.

Immediate modifications due to the definite effect of environment.

Permanent modifications accounted for by transmission of previously modified characters.

Modifications sufficient to form new strains or varieties. They become more pronounced each succeeding year until they come into equilibrium with the environment.

The same environment may produce different modifications in different plants.

The influence of previous environment in reference to variety testing.

The influence of previous environment on the practise of changing seed.

Productiveness and quality of grain not directly correlated.

There would seem to be an optimum development of vegetative portion of the plant for each environment, in order to produce a maximum of grain.

(2) The relation of wheat to climate and soil.

(a) Influence of climate upon yield and composition.
- A fairly cool, moist growing season favors a large yield of grain.
- A hot, dry growing season favors a high nitrogen content by arresting the development of the kernel.
- A hot, dry growing season also favors a large accumulation of nitrogen by the plant on a soil rich in nitrogen.

(b) Influence of soil upon composition and yield.
- Incomplete maturation produces high nitrogen content on manured soils.
- A poor soil may produce a wheat high in nitrogen thru failure to mature the crop.
- Nitrogenous fertilizers may slightly increase the percentage of nitrogen in wheat.

(c) Influence of soil moisture upon composition, yield, and and length of growing period.
- A concentration of the soil solution increases the percentage of nitrogen in the grain, and permits of rapid growth and early blooming.
- An insufficient supply of soil moisture prevents complete maturation of the crop and thus shortens the growing period.

(d) Conditions affecting the accumulation of nitrogen by the grain, or the yield of nitrogen in grain per acre.
- The supply of available nitrates and other plant food materials.
- The degree of concentration of the soil solution.
- The rate of transpiration.

(e) The conditions under which hard wheat is produced.
- Yellow berries in hard wheat.

(f) Improvement in yield accompanied by lower nitrogen content.

(3) The relation of corn to climate and soil.

(a) Influence of climate upon yield.
- Relation of heat units to length of growing period.
- Relation of yield to length of growing period.
- Relation of temperature to tillering.
- Relation of color of grain to climate.

(b) Influence of soil.
- Relation of tillering to available fertility.
- Relation of barren stalks to available fertility.
- Effect of available nitrogen on composition of kernel.

(c) Influence of soil moisture.

WEATHER BUREAU MEN AS EDUCATORS.

Classes from schools and colleges have visited the Weather Bureau offices to study the instruments and equipment and receive informal instruction, as reported from the following stations:

Dubuque, Iowa, May 18, 1907, about a hundred students from the Iowa State Normal School at Cedar Falls.

Honolulu, Hawaii, May 17 and 22, 1907, the physical geography section of the freshman class of Oahu College, in two divisions.

Little Rock, Ark., May 1 and 2, 1907, the physical geography class of the Little Rock High School, in two sections.

Reno, Nev., May 29, 1907, the physical geography class of the Reno High School.

Syracuse, N. Y., May 11, 1907, the physical geography class from the Warners, N. Y., High School.

THE COLD SPRING OF 1907.

By A. J. HENRY, Professor of Meteorology. Dated June 24, 1907.

The record of temperature for a year is made up of varying periods of increasing and diminishing heat. In spring the successive increments of heat are offset in a measure by incursions of cold northerly winds. These interruptions to the normal annual march of the temperature ordinarily last two or three days, sometimes a week, much less frequently a month, and in extraordinary cases, two months or more, as in the case of the present year.

The length of the cold spell in the south was about two months; in the northern part of the country east of the Rocky Mountains, about seventy-five days. At this writing, June 24, unseasonably cold weather prevails in southern Idaho, Nevada, and Utah, a part of the country exempt from the cold of April and May.

During the progress of the cold weather it was observed, first, that areas of low pressure had almost completely forsaken the main path which follows along the northern boundary to the Lake region and thence down the St. Lawrence Valley; second, that instead of following the northern route, they moved from the southwest to the New England coast, and there remained stationary for several days, meanwhile increasing in strength, and causing a succession of northeast to northwest winds with snow or rain over the whole of New England, the Middle Atlantic States, and as far west as Indiana and the upper Lake region. This departure from the usual behavior of lows continued thruout April.

In May and June the lows were mostly in the form of barometric troughs, which, developing in the far west, were continually crowded a little to the south, so that the northern portions of the respective troughs, instead of passing down the St. Lawrence Valley, generally past east-southeast over the Middle Atlantic States and the ocean south of New England. A movement in this direction holds the winds of New England and the Middle Atlantic States continually in a northerly quarter.

In June, lows from the Southwest, after reaching the Ohio Valley, were effectively blocked in their northeastward course, the result being the formation of secondary disturbances off the Virginia coast, which moved slowly northeastward over the ocean, and thus kept the wind in a northerly or northeasterly quarter over the northeastern portion of the United States. It was not until the middle of June that the prevailing high pressures in the north began to weaken, thus paving the way for southerly winds and warm weather.

Two broad principles in regard to the influence of pressure